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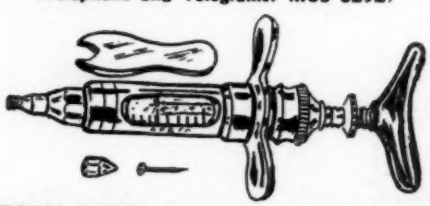

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The Pathogenicity of *Vibrio fetus*

A paper received from the Technical Development Committee of the B.V.A.

Introduction

THE organism *Vibrio fetus* was first named and its morphological, serological, and biochemical characters defined, by Smith and Taylor (1919). Smith (1919) recovered the organism from aborted bovine foetuses which had been shown to be free from *Brucella abortus* and described in detail the pathological changes produced on foetal membranes by infection with *V. fetus*. He was of the opinion that this organism was the same as that which M'Fadyean and Stockman (1913) had isolated from ovine and bovine foetuses in Great Britain.

Smith (1919) reported a series of transmission experiments in which pregnant cattle were injected intravenously with pure cultures of *V. fetus*. Two out of 4 pregnant cows were infected by injecting cultures intravenously. Both animals gave birth to live calves, but the placentae of both showed catarrhal lesions and *V. fetus* was found on microscopical examination.

Smith (1923) injected intravenously 6 pregnant cows with pure cultures of *V. fetus*; 2 of these were also injected subcutaneously with the same *V. fetus* cultures. Four cows were killed at periods ranging from 18 to 42 days after inoculation. Three of these cows showed pathological lesions of the foetal membranes and vibrios were demonstrated either in smears or culturally. The remaining 2 cows aborted 3 weeks after the inoculations. On *post-mortem* examination, lesions were found in the foetal membranes and vibrios were demonstrated. Smith's view was that the disease was essentially one of the foetal membranes causing death and expulsion of the foetus at 5 to 6 months' gestation.

Following Smith's work, the organism was isolated from aborted foetuses on numerous occasions in many countries but it was associated particularly with sporadic abortions and to some extent with retained placentae. This work has been summarised by Plastridge and Williams (1948), Roberts, Gilman, and Larsen (1950), and Lawson and MacKinnon (1952). Plastridge and Williams (1943) employed the serum agglutination test for diagnosis and found high titres, especially in animals that had recently aborted. In 1947, Plastridge, Williams, and Petrie reported that 5 out of 6 bulls in 2 of 7 herds using natural service had high serum agglutination titres and they suggested that the bull should be regarded as susceptible to infection with *V. fetus*. Their observations in 10 *Br. abortus* free herds revealed an abortion rate due to *V. fetus* of 12 per cent. and they were the first to draw attention to the lowered conception rates which they observed in 10 herds in association with positive serum titres.

Clinical Evidence

Sjollema, Stegenga, and Terpstra (1949) reported that a form of enzootic sterility which was widespread in Holland was caused by *V. fetus*. In a series of 62 herds, in which vibrionic abortion had occurred, 54 showed low fertility. *V. fetus* was demonstrated, by microscopical examination, in the cervical mucus of cows with enzootic sterility and was never demonstrated in the cervical mucus of other cows. This enzootic sterility was associated with service by particular bulls which had low conception rates. Most cows failed to conceive to first service but a few did conceive, and of these, 5 to 10 per cent. aborted later at 5 to 6 months. Cows that failed to conceive to first service often had, subsequently, irregular oestrous periods ranging from 23 to 26 days or longer. After a period ranging from 4 to 6 months such cows conceived even to an infected bull. Thus the enzootic sterility was, in fact, a temporary infertility. These workers also reported that the semen quality of infected bulls was normal

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(only 6 of 53 infected bulls examined were producing poor-quality semen), and that there were no abnormalities in the genital organs of the bulls. They observed that the disease could be spread by artificial insemination.

Forty-nine animals were inseminated with the semen of an infected bull. Three became pregnant and 2 of these later aborted. *V. fetus* was recovered from the foetuses. The remaining 46 animals were re-inseminated with the semen of a healthy fertile bull. After a total of 67 inseminations 10 of these became pregnant, *i.e.* 6.7 inseminations per pregnancy. That this second bull was fertile was shown by the fact that 229 out of 253 healthy cows conceived after a total of 418 inseminations, *i.e.* 1.8 inseminations per pregnancy.

The results of the cultural examination of bovine foetuses received at the Central Veterinary Laboratory, Weybridge, in the period 1947-56 were as follows:—

TABLE I

Year	Foetuses examined	*Br. abortus* Nos.	Positive per cent.	*V. fetus* Nos.	Positive per cent.
1947	141	26	18·4	3	2·1
1948	171	44	25·7	7	4·1
1949	213	49	23·0	16	7·5
1950	329	37	11·2	34	10·3
1951	448	62	13·8	52	11·6
1952	479	81	16·9	37	7·9
1953	504	66	13·2	31	6·1
1954	536	73	13·6	22	4·1
1955	530	67	12·6	27	5·1
1956	392	42	10·7	34	8·4
	3,743	547	14·6	263	7·5

Investigations have been reported by Lawson and MacKinnon (1952) in herds from which foetuses, positive for *V. fetus*, had been obtained, and in other herds where diagnosis was made by the demonstration of the organism in the vaginal mucus or by the mucous agglutination test. The results of this investigation are tabulated in Table II.

In 1953 Flatla, Braend, and Sudboe reported their investigations on *V. fetus* in cattle in Norway. They gave the following breeding history of a bull infected with *V. fetus*:—

Total cows mated	53
No. conceived	9
No. which returned to oestrus after 3 weeks	5
" " " " " " 4 to 5 weeks ...	27
" " " " " " 6 weeks	4
" " " " " " 7 to 9 weeks ...	5
Information not available	3

By test mating this bull on virgin heifers, *V. fetus* was recovered from vaginal mucus. This mucus was also positive to the mucous agglutination test.

These workers also inseminated 2 virgin heifers with the semen of a virgin bull to which had been added a pure culture of *V. fetus*. The heifers developed vaginitis, failed to conceive, and had irregular heat cycles. *V. fetus* was recovered from the vaginal mucus 2 months after infection. These heifers were then inseminated with semen of a clean bull but they did not conceive until 3½ and 5½ months respectively.

TABLE II

No. of herds	Herd breeding History	Remarks
20	Marked infertility	In 11 herds, the disease was introduced by the purchase of an infected bull. In 3 herds, it was introduced following service of cows by a neighbour's infected bull. In 6, the mode of introduction could not be ascertained.
6	Infertility in the past	At the time of the inquiry, the infertility was described as "vague."
4	Infertility in the past	Heifers were showing considerable infertility but, in the cows, the conception rate was reasonably good. In each case the same bull was used for service in both the cows and heifers.
4	Infertility in a portion of the herd.	The section of the herd showing infertility in each case, was that served by the infected bull only.
6	Miscellaneous	This group comprised one "Flying" herd, two herds in which cows had been served by a neighbour's bull and, having aborted, were sold; and 3 herds in which no history of infertility, past or present, could be found.

Frank and Bryner (1953) reported that, in a study of the bacterial flora of the reproductive tract, *V. fetus* was the only bacterial species commonly found in connexion with cows failing to conceive both within a specific herd and in troublesome herds as a whole, and was found in 25 of 45 herds examined. In known infected herds, approximately 25 per cent. of 420 samples examined were culturally positive for *V. fetus*. In one herd of 80 cows using 5 bulls, one of which was infected, the breeding records are summarised in Table III.

Bulls 1 and 4 were virgin bulls. Bulls 2, 3, and 5 had been used before, and 5 was positive for *V. fetus*. Each female was assigned to a group for breeding to a specific bull and was not changed to another bull until after calving.

Later, Bryner and Frank (1955) showed that the organisms which had the morphological appearance of *V. fetus* could be divided, by biochemical tests, into 2 main groups. Those of the first group were catalase positive, did not produce hydrogen sulphide, and were isolated from the genitalia of infertile animals and aborted foetuses. They were considered to be true *V. fetus*. The organisms of the second group were catalase negative, produced large quantities of hydrogen sulphide, were found in the reproductive tracts of both fertile and infertile animals, but were never isolated from aborted foetuses. They

TABLE III

Bull number	Cows bred	Services	Pregnant cows	Services per pregnancy	*V. fetus* cultural examinations		Days lost 1st service to pregnancy
					Negative :	Positive :	
1	8	10	8	1·2	13	0	9·6
2	21	31	16	1·1	47	0	2·5
3	18	26	12	1·5	27	0	16·6
4	17	28	13	1·8	43	1	32·0
5	18	38	11	2·2	66	23	56·0
5 (i)	Cows which did not become infected :—						
	5	6	4	1·0	22	0	0·0
(ii)	Cows which did become infected :—						
	13	32	7	3·0	44	23	89·0

were considered not to be *V. fetus*. In addition, serological tests indicated that there was no relationship between organisms of the catalase positive and catalase negative groups.

Experimental Evidence

In 1951 Terpstra and Eisma reported on a series of experiments the results of which can be summarised as follows:—

1. *V. fetus* was isolated from the semen of a bull which had a history of infertility and had no other abnormality. Five heifers were served with this bull. *V. fetus* was recovered from the vaginal mucus of these heifers and they became positive to the mucous agglutination test. The oestrous cycles varied from 29 to 56 days. None conceived to first service. The heifers were served 1, 1, 2, 3, and 7 times respectively.

2. *V. fetus* was isolated from the semen of another bull. A heifer served by this bull returned to service after 6 weeks and *V. fetus* was isolated repeatedly from the vaginal mucus. Both the serum and the vaginal mucus gave positive agglutination reactions against *V. fetus*.

3. *V. fetus* cultures were added to the semen of a bull that showed good conception rates when used for artificial insemination. This artificially infected semen was deposited in the uterus of 7 yearling heifers while the animals were in oestrus. *V. fetus* was recovered from the vaginal mucus of all animals and the mucous agglutination test results were positive. Details of the breeding record of these animals were not given in the report but it was stated that their conception rates were comparable with those for the animals served with naturally infected bulls.

In addition, these workers studied the histopathological changes occurring in the uteri of infected animals. Young heifers that had been served by an infected bull were killed at varying intervals following service and, in addition to the usual cultural and serological examinations, their genital tracts were examined histologically. Although there were no gross changes, histological examination revealed a catarrhal endometritis and, to a lesser extent, a salpingitis and a cervicitis of an acute or subacute nature.

Lawson and MacKinnon (1952, 1953) reported an experiment in which they reproduced in virgin heifers the condition met with in the field by serving the heifers with infected bulls, by artificially inseminating the heifers with semen from infected bulls, and by inseminating the heifers with semen of clean bulls to which had been added pure cultures of *V. fetus*. They also investigated a possible virus cause by adding a filtrate of infected semen to clean semen.

The heifers were obtained from herds known to be free from infection and were arranged in groups kept in complete isolation. A young virgin bull from the same source as the heifers, and 2 adult bulls, from a herd known to be infected, were used for mating. Before exposure, all the heifers were tested regularly over a period of 4 months by subjecting vaginal mucus to cultural examinations and to mucous agglutination tests for *V. fetus* and for *Trichomonas foetus*. In all cases, the results were negative. Prior to and during the experiment, semen samples from the bulls were reported to be normal as regards motility, sperm concentration, and percentage of abnormal forms. The 3 bulls gave negative results to serum and semen agglutination tests against *V. fetus* and *Br. abortus* antigens. Semen was diluted 1:6 in egg-yolk-citrate buffer, stored at 4° C. and never used beyond the third day after collection.

The experiments and the results are summarised in Table IV; the criteria of infection were the recovery of the organism by cultural examination of vaginal mucus and positive mucous agglutination tests.

Lawson and MacKinnon (1958) infected 54 virgin heifers with *V. fetus* cultures. All the heifers became infected based on the recovery of *V. fetus* from the vaginal mucus. The animals were treated with various antibiotics and, subsequently, vaginal mucus from all these animals was cultured twice weekly for approximately 4 months. Twenty-seven of the animals were cured, as shown by negative cultural results, but the organism was still recovered from the other 27. At the first oestrous period following treatment and at any subsequent oestrous period, all the animals were inseminated with semen from a clean bull. The results of these inseminations are shown overleaf in Table V.

A further 23 heifers were inseminated with infected semen which had been diluted 1/6 in egg-yolk citrate buffer containing 500 μg. streptomycin, 500 I.U. penicillin, and 0.3 per cent. sulphanilamide per ml. of diluted semen. Five of these animals showed

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TABLE IV

Group	Number of heifers	Method of service and type of semen	Total number of services or inseminations	Number of animals infected	Number of pregnant animals	Remarks
I (*a*)	12	Natural service—infected bull	68	12	11	One animal barren after 10 services
(*b*)	12	Artificial insemination—with semen of infected bull	69	10	12	
(*c*)	6	Artificial insemination—clean semen	10	0	6	
II	12	Artificial insemination—clean semen + *V. fetus* culture	88	12	11	One heifer remained barren after 12 inseminations
III (*a*)	6	*V. fetus* cultures by mouth and artificial insemination with clean semen	13	0	6	One heifer aborted a *V. fetus* positive foetus at 187 days
(*b*)	6	*V. fetus* cultures instilled into the conjunctival sac—artificial insemination with clean semen	13	0	6	
IV	12	Artificial insemination with clean semen + filtrate of infected semen	26	0	11	The 12th animal did not cycle regularly and was inseminated twice unsuccessfully
V (*a*)	6	Artificial insemination with infected semen plus 1,000 I.U. penicillin per ml. diluted semen	23	4	5	One of these 5 aborted a *V. fetus* positive foetus at 163 days
(*b*)	6	Artificial insemination with infected semen + 1,000 μg. streptomycin per ml. diluted semen	33	4	6	
VI (*a*)	6	Natural service with clean bull	19	0	6	
(*b*)	6	Artificial insemination with semen of clean bull	9	0	6	

NOTE.—48 non-infected animals required 2·1 services or inseminations per conception but the 42 infected animals required 6·4 services or inseminations per conception.

TABLE V

	Number of animals	Number of pregnant animals	Total inseminations	Inseminations per pregnancy
"Cured" animals	27	27	43	1·6
"Infected" animals	27	17	92	5·4

evidence of *V. fetus* infection. Twelve heifers were inseminated with untreated semen and all became infected. The fertility results were as follows:—

TABLE VI

	Number of animals	Number of pregnant animals	Total inseminations	Inseminations per pregnancy
Infected animals (12+5)	17	15	92	6·1
Non-infected animals (23−5)	18	18	34	1·9

In another group of 24 heifers, Lawson and MacKinnon inseminated the animals with clean semen to which had been added *V. fetus* cultures and antibiotics. In 6 of the heifers, the semen was treated with 500 μg. streptomycin, 500 I.U. penicillin, and 0.3 per cent. sulphanilamide per ml. of diluted semen and 2 became infected; in a further 6 heifers the levels of antibiotics were doubled and again 2 became infected. For the remaining 12 heifers the semen was not treated with antibiotics and 11 contracted the infection. The fertility results were as follows:—

TABLE VII

	Number of animals	Number of pregnant animals	Total inseminations	Inseminations per pregnancy
Infected animals (11+2+2)	15	11	72	6·5
Non-infected animals (1+4+4)	9	9	20	2·2

In a controlled experiment reported by McEntee, Hughes and Gilman (1954), 9 maiden heifers inseminated with semen to which *V. fetus* cultures had been added, required 6.9 services per conception; 7 of these experienced at least one long oestrous cycle following insemination and 8 gave positive mucous agglutination tests at 50 days or more after insemination. Simultaneously, 10 heifers inseminated with semen from *V. fetus* infected bulls required 4.5 services per conception, 6 had at least one long oestrous cycle after insemination, and 9 gave positive mucous agglutination tests. As a control on the above, 9 heifers inseminated with semen from vibrio-free bulls or with semen to which antibiotics had been added, were found to require only 1.3 services per

conception, no long oestrous cycles were observed, and there was no evidence of vibriosis.

Frank, Bryner, and Caruthers (1956) reported on the examination of 329 females and 24 males. A detailed study was made of the breeding records of these animals which were maintained in 6 groups. Groups I, III, and V were on a research station, and Groups II, IV, and VI were in a breeding herd which had been kept under observation for more than 4 years. The findings were as follows:—

TABLE VIII

	Number of bulls	Group	Number pregnant	Average services per conception	Average days required per conception	Number of females infected as shown by cultural examinations	Type of vibrio isolated
Vibrio free	4	I	26	1·5	12	1*	Catalase negative
		II	40	1·5	22	0	—
Infected with catalase negative vibrios	14	III	86	1·5	16	10	Catalase negative
		IV	135	1·7	25	14	Catalase negative
Infected with catalase positive vibrios (*V. fetus*)	6	V	6	6·0	215	6	Catalase positive
		VI	36	3·6	128	30	Catalase positive

*A single isolation of a catalase negative vibrio from one heifer after a third service.

A close relationship was demonstrated between the incidence of *V. fetus* infection in bulls and the resultant infertility in cows and heifers bred to these bulls. Catalase-negative vibrios were frequently isolated from bulls that had been used for service but not from unbred heifers, and a low rate of infection was obtained in susceptible cows and heifers bred to these catalase-negative, vibrio-infected bulls. The conception rates were similar to those obtained with vibrio-free bulls. Catalase-positive vibrio (*i.e. V. fetus*) was not isolated from virgin bulls and heifers but this organism was readily recovered from susceptible heifers served with infected bulls. With *V. fetus* infected bulls, there was a significant increase in the number of services required per conception and also in the time required to get the animals in calf. It was suggested that some strains of *V. fetus* were more virulent than others. Evidence of that was demonstrated by the transmissibility, persistence of infection, and prolonged infertility in Group V as compared to Group VI.

In an experiment, of which a short account is given in the 1955-6 Annual Report of the Animal Research Division of the New Zealand Department of Agriculture, 6 animals, 3 uninfected cows and 3 virgin heifers, were mated with an infected bull. This bull was from a herd which had a high proportion of positive mucous agglutination tests. The results reported are summarised below in Table IX.

In addition, a known fertile bull was mated with 5 non-infected cows and then with 4 naturally-infected cows with results set out in Table X (overleaf).

V. fetus was subsequently isolated from the bull used in this experiment.

In the same report, data are given on the effect of streptomycin treatment following insemination with artificially-infected semen. Three groups of cattle were used:—

Group I. Inseminated with artificially-infected semen and treated 2 or 3 days later with 1 gramme streptomycin in 30 ml. isotonic saline injected into the uterus.

Group II. Inseminated with artificially-infected semen.

Group III. Inseminated with non-infected semen. (See Table XI.)

Akkermans, Terpstra, and van Waveren (1956) reported studies on several hundred strains of vibrios isolated during the course of sterility investigations. These vibrios could be divided into 3 groups according to their cultural, biochemical, and morphological characteristics, thus:—

Group I. Pathogenic—the *V. fetus* of Bryner and Frank.

Group II. Apathogenic—the non-pathogenic vibrios of Bryner and Frank.

Group III. Abortion. These were isolated from aborted foetuses not related to outbreaks of

TABLE IX

Number of cows	Number pregnant	Conception rate	Mean interoestral period (days)	Vibrionic abortions	*V. fetus* positive cultures
6	4	4·5 services per conception	28·8	0	16/89

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TABLE X

	Number of cows	Number pregnant	Conception rate	Mean inter-oestral period (days)	Vibrionic abortions	*V. fetus* positive cultures
Non-infected	5	5	1·2 services per conception	21·0	0	0
Infected	4	3	4 ,, ,,	30·875	1	7/50

TABLE XI

Group	Number of cows	Number pregnant	Conception rate	Mean interoestral period (days) Pre-service	Post-service	Vibrionic abortion	*V. fetus* positive cultures
I	8	8	1·75 services per conception	21	23	0	2/69
II	8	4	5 ,, ,,	20·75	28·83	0	24/71
III	6	6	1 ,, ,,	—	—	0	—

sterility and the cases of abortion occurred only singly on affected farms.

There was some serological relationship between strains of Groups I and III, but not between strains of Groups II and those of Groups I and III.

In a small experiment, these workers inseminated 3 groups of 3 heifers with the semen of a bull of good fertility. Then 0.1 c.c. of a 2 to 4-day-old vibrio culture in blood broth was introduced, so that the heifers of each group were infected with vibrio of either Group I, II, or III. The results were as follows:—

TABLE XII

Group	Number of heifers	Number pregnant	Number of inseminations	Cultural results	Vaginal mucous agglutination test results
I	3	0	11	All positive	Group I Antigens-positive Group III Antigens-negative
II	3	2	9	All negative	Negative—even to homologous strain
III	3	3	9	All negative	One animal reacted to homologous strain but was negative to all other group antigens

Effect on Fertility of the Addition of Antibiotics to the Semen of *V. fetus* Infected Bulls

Adler and Rasbech (1952) reported their investigations into the effect of the addition of antibiotics on fertility of bull semen with special reference to *V. fetus* transmitting bulls. Nine out of 11 bulls gave significantly increased conception rates by the addition of 5,000 μg. per ml. streptomycin to the egg-yolk semen diluent. Their results are given in Table XIII.

Of the 9 bulls that gave significantly increased conception rates by the addition of antibiotics to the semen, 6 were shown, by test mating on heifers, to be carriers of *V. fetus* and 3 were negative. One bull that was positive for *V. fetus* did not have an improved conception rate by the addition of antibiotics. This work has been amply confirmed by other workers and the results show that the addition of antibiotics to bull semen significantly increases the conception rates of some but not all bulls. Further, not all bulls whose conception rates are thus improved are necessarily infected with *V. fetus*.

Field evidence on the effect on conception rate of infection with the catalase-positive *V. fetus* was given by Willett, Ohms, Frank, Bryner, and Bartlett (1955) (Table XIV overleaf).

These results showed that there was a significant increase in the non-return conception rate when the antibiotic was added to the diluent used for the semen from the *V. fetus* infected bulls. There was also evidence, by comparison of the difference between the 28- to 35-day and 60- to 90-day non-return conception rates, that the antibiotic reduced the rate of early embryonic mortality in the animals inseminated with *V. fetus* infected semen.

TABLE XIII

Bull	*V. fetus* carrier	Per cent. non returns: Control diluent (no antibiotics)	Per cent. non returns: Experimental diluent (+ antibiotics)	Significant gain
11	—	64	63·6	—
22	—	59·5	65·9	+
27	+	55·4	58·5	—
28	+	54·4	67·7	+
29	—	50·9	62·7	+
31	—	49·7	66·0	+
32	+	45·1	66·1	+
33	+	44·9	62·8	+
34	+	44·4	62·4	+
35	+	44·4	64·4	+
36	+	41·9	62·9	+

TABLE XIV

	Number of bulls		No antibiotics in diluent	Penicillin + streptomycin in diluent
Bulls infected with *V. fetus*	7	Number of 1st inseminations	2,483	2,444
		C.R. at 60 to 90 days	52·4 per cent.	68·1 per cent.
Bulls infected with catalase negative vibrios	3	Number of 1st inseminations	653	667
		C.R. at 60 to 90 days	63·1 per cent.	68·5 per cent.
Bulls free from any vibrio infection	78	Number of 1st inseminations	20,033	20,088
		C.R. at 60 to 90 days	65·3 per cent.	67·4 per cent.

From the Reading Cattle Breeding Centre (1958) it was reported that, in a split-sample field insemination trial involving 13,294 first inseminations with the semen from 16 bulls, a significantly increased conception rate was obtained with 3 of the bulls when their semen was used in a diluent, containing 500 μg. streptomycin per ml. of diluent. Two of these bulls were later found to be infected with *V. fetus*. The following are the details of this trial:—

TABLE XV

Bull number	No streptomycin in diluent		Streptomycin in diluent		X^2 Test P =
	1st inseminations	16 week non-return per cent. C.R.	1st inseminations	16 week non-return per cent. C.R.	
F4 —*V. fetus* positive	876	48·5	831	62·2	<0·001
S12—*V. fetus* positive	510	30·7	458	41·7	<0·001
S2 —*V. fetus* negative	507	57·0	524	63·5	0·05–0·02
13 bulls *V. fetus* negative	4,809	60·1	4,779	61·1	>0·05
Totals—16 bulls	6,702	56·1	6,592	60·1	<0·001

An opportunity was also afforded at Reading to examine for pregnancy 541 maiden heifers which had been inseminated during the investigation with semen from either *V. fetus* infected or clean bulls, from which the semen had been diluted on a split sample basis in the usual egg-yolk citrate diluent with and without the addition of streptomycin.

TABLE XVI

Bulls used for 1st insemination	Number of bulls	No streptomycin in diluent		Streptomycin in diluent		X^2 Test P=
		Number of heifers	Per cent. pregnant to 1st inseminations	Number of heifers	Per cent. pregnant to 1st inseminations	
V. fetus negative	7	161	50·3	230	56·5	>0·05
V. fetus positive	2	68	22·1	82	52·4	<0·001
Totals	9	229	41·9	312	55·4	0·01–0·001

These results showed that with the *V. fetus* infected bulls there was a significant increase in the pregnancy rate with the addition of streptomycin to the semen diluent.

Characteristics of the Species *V. fetus*

The term *V. fetus* was first suggested by Smith and Taylor (1919) for an organism associated with disease of the foetal membranes in cattle. Morphologically, the organism was 0.2 to 0.3 μ wide, 1.5 to 2.0 μ long, the diameter of the spiral being 0.5 μ. All strains were actively motile with a single (rarely two) polar flagellum. Growth on artificial media was generally poor and occurred best in sealed tubes. None of the strains produced indole and none fermented lactose, glucose, or sucrose. Serologically, all the strains isolated from bovine foetuses were related. Its distinctive morphology and its requirement of added CO_2 for growth have since been the main characteristics for the identification of *V. fetus*.

Florent (1953) and Thouvenot and Florent (1954) isolated and described a saprophytic vibrio from the semen of bulls and the vagina of cows. They named it *V. bubulus* and it differed from *V. fetus* in that it produced hydrogen sulphide whereas *V. fetus* did not. It was also a strict anaerobe. Furthermore, the two species were antigenically quite different. Bryner and Frank (1955a, b) examined 164 cultures of bovine vibrios for catalase activity, production of hydrogen sulphide, and for reduction of nitrates to nitrites. They divided them into 2 groups. Group I strains were catalase positive, reduced nitrates to

nitrites, and did not produce hydrogen sulphide, whereas Group II strains were catalase negative, produced hydrogen sulphide, and reduced nitrates to nitrites. Group I (catalase positive) strains were isolated from aborted foetuses, from bulls of low conception rates, and cows with repeat-breeding histories, whereas Group II (catalase negative) strains were isolated from bulls with high conception rates and from virgin bulls. They were not isolated from aborted foetuses. There was no cross agglutination between strains of the two groups. Similar findings have been reported by Price, Poelma, and Faber (1955), Kuzdas and Morse (1956), Lindquist (1955), and Morgan (1956).

Akkermans, Terpstra, and van Waveren (1956) described a third group of bovine vibrios. Strains of this Group III were catalase positive and also produced hydrogen sulphide and were related antigenically to strains of Group I (but not to strains of Group II). They were only isolated from aborted foetuses in cases of sporadic abortion.

The serology of *V. fetus* has been reported by Marsh and Firehammer (1953), Price, Poelma, and Faber (1953, 1955), Wiidik and Hlidar (1954), Juhler (1955), and Biberstein (1956). Most strains have been shown to be related antigenically although differences, quantitative rather than qualitative, exist. Nearly all workers have also shown that a few strains are distinct from the ones constituting the main group.

In conclusion, therefore, it has been shown that *V. fetus*, besides its distinctive morphology and its need for a reduced oxygen tension for growth can be further identified by being catalase positive, does not produce hydrogen sulphide, reduces nitrates to nitrites, and does not ferment sugars. Most strains are related antigenically. It constitutes the so-called Group I vibrios of Bryner and Frank and of Akkermans *et al.* (1956), and causes temporary infertility in cattle. Vibrios of Group II can be differentiated by being catalase negative and produce abundant hydrogen sulphide. They are non-pathogenic but must be differentiated from *V. fetus* in diagnosis. Group III vibrios as defined by Akkermans *et al.* (1956) differ from those of Groups I and II by being both catalase positive and H_2S positive but they are related antigenically to Group I strains. They cause sporadic abortions not associated with herd infertility.

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THE ROYAL SOCIETY OF HEALTH CONGRESS

Immediately before the veterinary hygiene section of this Congress—which will be reported next week—a number of veterinary surgeons enjoyed the hospitality of Mr. R. Turnbull of Eastbourne at an informal discussion in his home. It had been suggested by a former President of the B.V.A. that such a meeting would serve the useful purpose of stimulating discussion in the Congress and enabling the veterinary hygiene section to be more effective. The meeting was most successful and members much appreciated Mr. Turnbull's kindness.

ADVERTISERS' ANNOUNCEMENTS

GLAXO LABORATORIES LTD. announce price reductions from May 5th on the following products: Streptovex (veterinary oral solution of streptomycin sulphate), Predsolan (veterinary prednisolone injection), and Veterinary Dimycin (streptomycin and dihydrostreptomycin injection).

They also announce the introduction of "Erysilin," the new vaccine in emulsion form for immunisation against swine erysipelas. It is available on the home market in 20-c c. and 50-c.c. vials.

THE DISTILLERS COMPANY (BIOCHEMICALS) LIMITED announce a reduction in their prices of streptomycin preparations, effective from Monday, May 12th, 1958. The products affected are "Streptaquaine" Solution Veterinary, "Mixtamycin" Solution, Streptomycin DC(B)L, and Dihydrostreptomycin DC(B)L.

Skin Grafting in Horses—A report of three cases

BY

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SUMMARY.—Three cases of skin grafting in horses are described, two of which were successful.

Introduction

THE treatment of wounds of the limbs of horses often presents a difficult problem. In cases where the wound is in the near vicinity of a joint or tendon the movement of these structures causes a constant mechanical breakdown in the healing process, with the resultant formation of exuberant granulation tissue, or "proud flesh." In long-standing cases marked fibrosis occurs in addition, causing the formation of a fibro-granuloma. This complication can often be avoided by the application of pressure bandages to the wound, which has the effect of suppressing the excessive growth of granulation tissue. However, if there has been appreciable loss or destruction of skin, healing may be delayed indefinitely owing to the failure of the epithelium bordering the wound to grow inwards and cover its surface. It therefore persists as a raw granulating area.

Woosley and Schaffer (1952) in America described a method of treating such wounds by skin grafting. Their method was briefly as follows.

The wound was first prepared by trimming away excess granulation tissue to a level just below that of the skin edges. Dressings were applied until a new spongy layer of granulation tissue had developed (about 14 days). Epithelium for the grafts was obtained from a region just lateral to the anus, a shaved area about 1 in. square being removed with a razor under local anaesthesia. Ideally, the cut was made through the papillary layer of the corium so that a few centres of the stratum germinativum were left to epithelise the denuded area. The epithelium was cut into seed grafts about 2 to 3 mm. in size, which were placed in sterile normal saline. The grafts were implanted in the granulating wound by grasping each in turn with sharp pointed forceps and thrusting them to a depth of about 3 to 5 mm. into the granulation tissue. The forceps were then withdrawn leaving the grafts embedded in the wound. The grafts were placed at intervals of about 1 cm. until the whole of the wound was covered. Grafting proceeded from the lower portion of the wound upwards so that the haemorrhage which occurred did not obscure the untreated area. After-treatment consisted of maintaining pressure dressings over the wound in order to retard the growth of granulation tissue. These authors reported that of 7 horses treated by this method, satisfactory results were obtained in five.

More recently Uberreiter (1956) has described the successful treatment of severe wounds in dogs, cats and horses, using Thiersch grafts. In this method the wound was almost completely covered by grafts from the donor site, these being maintained in position by fine sutures, or a pressure bandage. Healing was in most cases complete after 14 days.

In this communication three cases of skin grafting in horses by the method of Woosley and Schaffer are described.

Case 1

Subject. 3-month-old pony colt foal.

Lesion. The wound was situated on the anterior aspect of the right hind leg, midway between the hock and fetlock. It was about 4 in. in length and 2½ in. wide, and at its deepest point extended almost down to the bone, the tendon of the extensor pedis being completely severed. The wound, which was obviously traumatic, had been sustained some days previously, as granulation had already commenced. It was severely infected, and there was marked suppuration. Owing to the rupture of the extensor tendon, there was complete knuckling of the fetlock joint whenever weight was put on the affected leg.

Treatment. After the administration of anti-tetanus serum the wound was treated locally by the liberal application of penicillin ointment and sulphonamide powder, and a bandage firmly applied. Dressings were replaced on alternate days. Infection

FIGS. 1 and 2.

CASE 1. — Immediately prior to grafting.

CASE 1.—Sixteen weeks after grafting.

was quickly controlled and healthy granulation commenced. Within a week the wound consisted of a flat plaque of healthy granulation tissue level with the skin (Fig. 1). Owing to the extensive loss of skin it was considered unlikely that the wound would resolve under conservative treatment alone and it was decided to attempt repair by skin grafting.

Procedure. The colt was cast, and lightly anaesthetised with chloral hydrate. Grafting was performed according to the method described by Woosley and Schaffer which was found to be technically easy and straightforward. After grafting the wound was covered with a piece of penicillinised soft paraffin* gauze, padded with cotton wool, and firmly bandaged with elastic adhesive plaster.

Result. The wound was not interfered with until the seventh day, when the dressing was removed. The dressing was soaked in exudate, but the wound when wiped clean had a healthy appearance, although there was no sign of the grafts having taken. The wound was redressed as before. Five days later when the dressing was next removed, it was found that a severe pustular dermatitis had developed where the adhesive bandage had been in contact with the skin. A gauze bandage was therefore substituted in this and subsequent dressings. The dermatitis rapidly responded to applications of penicillin ointment. The wound was redressed at approximately 5-day intervals. The wound maintained a healthy appearance, but knuckling of the fetlock persisted. Twenty-eight days after grafting the first signs of grafts having taken were observed in the form of 5 "punched out" areas about $\frac{1}{4}$ in. in diameter, and dark grey in colour. A week later 5 more grafts appeared, and by this time a thin transparent layer of young epithelium had extended from the grafts, covering the whole of the wound except for an area 1 in. in diameter at its lower lateral aspect. It was hoped that the epithelium would spread over the still uncovered area, but after a week had elapsed this appeared unlikely, for by this time the granulation tissue had begun to overlap the skin edges of the wound, and also the successfully grafted area. This granulation tissue appeared to be too mature for regrafting; it was therefore decided to remove it and allow new vascular granulation tissue to replace it prior to the implantation of new seed grafts. Five mls. of local anaesthetic† were infiltrated subcutaneously in a line 1 cm. from and parallel to the lateral and dorsal skin edges of the wound. The excess granulation tissue was removed with a scalpel, and the wound dressed and bandaged in the usual manner. Four days later, when the bandage was removed, it was found that there was considerable suppuration of the wound, and all traces of the new epithelium had vanished leaving a raw granulating area. In addition, the grafts themselves had assumed a dull dirty brown appearance and appeared to be dead. It was thought likely that the local anaesthetic had killed the grafts. The wound was redressed and bandaged, then 4 days later all dressings were removed. The wound rapidly dried up and became covered with a thick layer of dried exudate, and a week later the colt was turned out to grass. The wound remained flat and dry, and after some 17 days the scab fell off revealing 9 healthy grafts, black in colour and about $\frac{1}{4}$ in. in diameter. The area of the wound unoccupied by grafts was covered with young epithelium except for a small flat area at its ventral part. From this stage the pigmented areas slowly extended, and those nearest one another coalesced. Epithelisation of the wound was not complete until 5 months after grafting (Fig. 2). At this stage the sites of the original grafts were marked by small pits about $\frac{1}{8}$ in. in diameter and $\frac{1}{4}$ in. deep from three of which tufts of hair protruded. Presumably these originated from follicles incorporated in the seed grafts. Apart from these tufts the healed wound was devoid of hair. There was some thickening of the limb at the site of the wound but function was unimpaired, and there was no tendency to knuckle. The pony was sold 7 months after the operation, at which time the scar was almost completely obscured by hair from the adjacent skin, and the thickening of the limb was reduced to almost negligible proportions.

* Vaseline.

† Three per cent. Xylotox.

Case 2

Subject. 7-year-old black hunter gelding.

Lesion. There was a large ulcerating fibrogranuloma measuring approximately 4 in. in diameter situated on the anterior aspect of the right hind leg about 6 in. below the stifle. The wound had been repeatedly cauterised in an unsuccessful attempt to promote healing by retarding the growth of exuberant granulations.

Procedure. The horse was cast and all excess granulation tissue removed under light chloral hydrate anaesthesia. The wound was dressed with penicillinised soft paraffin* gauze, padded with cotton wool and bandaged. The dressings were left in place for 10 days, after which time the horse was again cast and anaesthetised. The bandage was removed, revealing a flat plaque of healthy granulation tissue. However, an alarming feature was a severe purulent dermatitis where the adhesive bandage had been in contact with skin. The affected areas of skin were washed and dressed with penicillin ointment. The seed grafts were then implanted in the granulating wound as previously described. The wound was dressed in the usual manner, but owing to the irritant action of the adhesive bandage a gauze bandage was substituted. It was feared that owing to the tapering of the leg at the site of the wound, and the constant flexing of the stifle, difficulty would be encountered in maintaining the gauze bandage in position. This in fact proved to be the case, and in spite of all efforts to the contrary it continually slipped down the leg. An adhesive bandage could not be used for fear of causing

* Vaseline.

irreparable skin damage, and for this reason the attempt at grafting the area had to be abandoned.

Case 3

Subject. Yearling Thoroughbred filly.

Lesion. The filly had sustained a severe injury to the left hind leg. On the anterior aspect of the leg there was a large lacerated wound, its lower aspect being at the level of the fetlock joint. A large portion of the extensor tendon was exposed, as also was the medial aspect of the cannon bone. A considerable area of skin had been lost from this site. Above this wound, on the lateral aspect of the cannon, the skin was severely contused, and there were 2 small puncture wounds at this site. (See Figs. 3 and 4.)

FIGS. 3 and 4.

CASE 3.—Before treatment. Antero-external aspect.

CASE 3.—Before treatment. Antero - internal aspect. The white area is the metatarsal bone.

Treatment. The filly was given 1,000 I.U. antitetanic serum subcutaneously. The wounds were dressed with sulphonamide and bandaged. For 4 days penicillin was administered parenterally. Granulation proceeded rapidly, but after 14 days 2 sinuses discharging purulent material developed, one at the lateral aspect of the fetlock and the other higher up the leg at the site of the lower of the 2 punctured wounds. The lower sinus led into a small abscess which was opened surgically. Radiography of the leg at the level of the upper sinus revealed a sequestrum of bone. This was removed under general anaesthesia by Professor J. G. Wright. No further sepsis developed at either site.

One month after the original injury the upper wounds had healed and the lower wound consisted of a flat granulating area approximately 5 in. by 3 in. in size. The wound was implanted with seed grafts as in the previous cases. Of the 120 grafts, 30 "took," the first of these appearing 3 weeks after implantation. Epithelium from the grafts gradually spread over the granulating wound. It was also noted the appearance of the grafts appeared to stimulate the ingrowth of epithelium from the edges of the wound. Woosley and Schaffer made a similar observation in regard to their cases. (See Fig. 5.)

Two months after implantation of the grafts the wound was completely covered by a thin layer of epithelium, and the pressure bandage was accordingly removed. This proved to be a mistake, for considerable swelling developed overnight, and a split half an inch wide developed in the young epithelium over the whole length of the wound. The swelling probably resulted from the sudden increase in blood flow to the part following removal of the bandage. Had the pressure been gradually decreased over a period of 2 or 3 days by progressive loosening of the bandage this mishap could probably have been avoided. As it was, the dressings were loosely reapplied for a further 8 weeks by which time the healing was complete.

The filly was discharged 5½ months after being admitted. There was some fibrous thickening of the affected fetlock but this caused no interference with her action. (See Fig. 6.)

FIGS. 5 and 6.

CASE 3.—Five weeks after grafting. Antero-internal aspect. Grafts just visible.

CASE 3.—Fourteen weeks after grafting. Anterior aspect.

Discussion

It is felt that this method of treating severe granulating wounds on horses' legs merits a trial in cases where more conventional methods have failed. The operation is easily and quickly performed, and in quiet subjects could be carried out under local

(*Concluded at foot of col. 1 overleaf*)

Current Literature

BOOK REVIEWS

Veterinary Anaesthesia. By J. G. WRIGHT. 4th ed. Pp. xiv + 318. 91 illus. Baillière, Tindall & Cox Ltd., London. 30s.

The fourth edition of this work appears after the now customary five-year interval. This interim period has been one of change and advance in the ever-flexible field of veterinary anaesthesia; not the least factor has been the rescission of the obsolete Animals Anaesthetic Act of 1919 thus leaving the modern veterinary surgeon complete discretion in his choice of agent and method; add to this the return to favour of pre-anaesthetic medication, the introduction of so-called "balanced" anaesthesia into the veterinary field, the preliminary investigations of the new anaesthetic agent Halothane and the various advances in resuscitation techniques and it will be seen that the new edition of Wright's classical textbook could scarcely be more opportune. It is hardly necessary to say that the author has taken full advantage of this opportunity.

Not only is the new edition brought up to date by additions, but judicious deletions have given the work a welcome contemporary look. Omissions from the new volume include cannabis indica narcosis in the horse (this is replaced by consideration of chlorpromazine), and the chapter on anaesthesia for castration of the male, in the latter connexion the author feeling, rightly in our view, that the veterinarian's new legal freedom in this field gives him complete discretion in choice of method. Would it be an impertinence to suggest that the chapter on Bromethol anaesthesia in the cat might likewise be consigned to the realms of historical interest?

The author keeps always in the forefront of his mind the very practical requirements of the surgeon in day-to-day veterinary practice—in this lies so much of the great value of this book to students and clinicians alike—and thus in dealing with "balanced" anaesthesia he underlines the requirement in this connexion for a highly-trained anaesthetist and considers very critically the place of such techniques for ordinary veterinary surgery. At the same time, in the case of small animals at least, the author still expresses a preference for barbiturate anaesthesia *per se*; many clinicians will agree with him in this, both pentobarbitone and thiopentone sodium retaining many adherents, none the less there is a trend, even in the average practice, to reduce the dose of barbiturate to a minimum by the use of newer narcotic and tranquilliser drugs in varying forms of combined anaesthesia. One wonders how many people will agree with Wright's persistent contention that for intravenous injection in the dog, the vein generally selected is the recurrent tarsal! At a conservative estimate 95 per cent. of clinicians use the radial vein and many modern students have never heard of the recurrent tarsal being used even if they recall its existence.

On the relaxant drugs the author brings to bear the full weight of his opinion and authority to publicise and reinforce Hall's dictum on their use, a sane and essentially humanitarian viewpoint that none will wish to modify.

Despite the use of the reviewer's privilege to indulge in a modicum of captious criticism it must be emphasised most strongly that this is a book of the highest possible standard, without doubt the

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Skin Grafting in Horses—*Concluded.*

anaesthesia. No expensive drugs are required, and post-operative treatment merely consists of regular dressing of the wound, which can quite well be carried out by a lay person.

The main disadvantage of the method is the prolonged period of healing, which in the 2 successful cases reported here was approximately 5 months. In both of these, however, healing was retarded by factors which in the light of experience could probably have been avoided—in Case I the apparent destruction of the grafts and new epithelium which followed the second interference; in Case 3 the splitting of the young epithelium caused by the swelling which followed removal of the bandage. Had these complications not occurred healing would probably have been complete in 2 to 3 months. Nevertheless, this compares very unfavourably with the 2 to 3 weeks healing period reported by Uberreiter using Tiersch grafts.

An important advantage of the seed graft method is that owing to the small size of the grafts, and the fact that they are embedded in granulation tissue, they are unlikely to be affected by movement of a neighbouring joint or tendon. Uberreiter does not give details of his equine cases, but it seems possible that the Thiersch grafts used by him would be more liable to be affected by such movement, owing to their relatively large area, and superficial position.

The failure of Case 2 cannot be ascribed to any basic fault in the method described by Woosley and Schaffer. It does, however, emphasise that for grafting to be successful the lesion should be in a site which can be firmly bandaged for an indefinite period. In this respect wounds involving the lower part of the limbs are more suitable than those above the hock or knee. There is little doubt that skin grafting in horses is a technique which has useful possibilities in general practice. The procedure is relatively simple, and provided adequate immobilisation of the dressings over the grafted area can be effected, the chances of complete healing are good.

Acknowledgments.—The author wishes to thank Professor J. G. Wright for his interest and advice in these three cases.

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classic of veterinary anaesthesia in the English language and a worthy example of the standard to be set by a notable surgeon and a great teacher. No person who aspires to practise veterinary surgery can afford to be without the latest edition of this work.

The Alimentary Tract of the Ruminant. By DAVID BENZIE and A. T. PHILLIPSON. Oliver & Boyd, Edinburgh and London. 27s. 6d.

This monograph presents the results of a radiological investigation into the alimentary tract of domesticated ruminants. Most of the book is made up of 40 plates each of which has one or more radiographs with a labelled outline drawing to indicate the salient features. The radiographs have been obtained from an X-ray apparatus at the Rowett Research Institute and from a film made by the cine-radiography apparatus of the Department of Anatomy, Manchester University.

The radiographic technique has been used to investigate the disposition of ingested radiopaque food and liquid in the various stomach compartments and in the other parts of the alimentary tract. Activity of the oesophageal groove in the young animal can be demonstrated especially well by this method. The differential development of the stomach compartments of the post-natal calf and goat are also very well illustrated.

The techniques together with some discussion of the theory and value of these techniques in gastro-enterology occupy about half of a 24-page introduction to the monograph. The remainder of the discussion is a comment on the illustrations.

The book as a whole is extremely well produced with very agreeable print on very good paper. The quality of the prints of the radiographs vary considerably and some would be very difficult to interpret without the guiding hand of the line drawings. The monograph is, however, a very valuable contribution to our knowledge of the abdominal anatomy of ruminants and provides further information to those interested in comparative gastro-enterology. It will be of use to teachers and research workers but is of too specialised a nature to be of great value to most veterinary surgeons.

Veterinary Protozoology. By U. F. RICHARDSON and S. B. KENDALL. Oliver and Boyd, Edinburgh and London, 1957 Second, revised edition. Pp. xii + 260. 22s. 6d.

Marked advances have been made during the past few years in some aspects of veterinary protozoology, more particularly in the field of chemotherapeutic research. The appearance of new drugs, many of which are now being used extensively in the field control of protozoal diseases, has led to an increase in the fundamental research into the ways in which drugs act on parasites and into the physiological processes governing host-parasite relationships. Because of this and for other reasons it became evident that the first edition of Richardson's "Veterinary Protozoology," published in 1948, had become somewhat out of date. The preparation of this new edition, therefore, provided Mr. Richardson, who has been joined by Dr. Kendall as co-author, with the opportunity to make a comprehensive revision of the text, with particular reference to the recent advances in treatment and control.

Generally, each disease is considered under the headings of: the morphology of the causal organism, its distribution and transmission, species susceptible, symptoms and pathogenicity, diagnosis, treatment, and control. The use of bold type headings, a feature lacking in the first edition, is a definite improvement. The chapter on chemotherapy has been considerably enlarged and includes information on the evaluation of chemotherapeutic substances and on special terms used in chemotherapy such as synergism and potentiation, drug-fastness, etc. There is also up-to-date information on the chemistry, pharmacology, and use under practical conditions of the principal drugs which have proved active against protozoa. One important and welcome aspect of the revision of the text is the considerable enlargement of the chapter dealing with techniques and equipment. Information on techniques has been augmented and brought up-to-date and there are useful notes on the culture and maintenance of strains of protozoa and on serological tests. It has been the aim of the authors to provide a textbook that will be of use to under- and post-graduate students of veterinary protozoology and also to furnish the field worker in the United Kingdom and in tropical countries with a serviceable handbook. In this, they have succeeded.

The Monkey Kingdom (an Introduction to the Primates). By IVAN T. SANDERSON. Hamish Hamilton, Ltd., London. 35s.

This is a book which should appeal to a wide public; it is extremely readable, full of information, and beautifully illustrated. The 181 pages deal in turn with the main groups of monkeys and monkey-like animals starting with "The Ascent of the Shrews" and "The Bawling of the Bushbabies" and working up to "The Superiority of the Apes" and "The Descent of Man." All the titles are most intriguing and the information contained in these chapters is fascinating. A theory of evolution is traced but there is no dogmatism, in fact, those who thought that all mammals still extant were neatly docketed will have a big surprise, as apparently remarkably little is known about many of the monkey tribes and the author makes no sweeping claims for knowledge which he cannot substantiate. The information includes most interesting descriptions of the various countries in which monkeys are found and gives simple maps for those whose geographical knowledge is hazy. The illustrations include 35 excellent coloured plates, numerous good photographs, and a large number of most attractive black-and-white sketches. There is also a comprehensive index. This book is really the ideal family present, suitable for all ages and all intellects, useful as a book of reference, extremely educational, and yet interesting for the superficial reader. An additional attraction for the donor is the fact that it is well got up and has an expensive look at a reasonable price.

XUM

IN BRIEF

The Aetiology of Grass Tetany

Hypomagnesaemic tetany as a clinical condition appears to be peculiar to ruminants. In these animals it can take several forms, of which in recent years, grass tetany has become of considerable importance. This condition arises when cattle are "turned out" on to lush pasture in spring and early summer. Not all lush pastures will produce the condition and the so-called "tetany-producing pastures" retain this property for a few weeks only. The physiological basis for the rapid fall in serum magnesium which occurs has yet to be determined, though certain clues have been obtained, notably at Weybridge and Shinfield.

A satisfactory explanation of the aetiology of grass tetany must account for several awkward facts.

(1) On a given pasture, the condition arises only if the animals are turned out during a relatively short "danger period."

(2) When the condition arises, chemical analysis shows that the herbage contains sufficient magnesium to give an adequate daily intake. Despite this, the condition can be prevented by "flushing" the animal with a daily dose of magnesium oxide during the danger period or increasing further the magnesium content of the pasture.

(3) The fall in serum magnesium concentration occurs rapidly, often within hours of "turning out"; this seems to rule out simple dietary deficiency.

An understanding of the aetiology of grass tetany is not made any easier by the difficulty of producing the condition and the general ignorance of the mechanisms responsible for magnesium homeostasis. Recently workers at Weybridge and Shinfield (Bartlett *et al.*, 1954; Bartlett *et al.*, 1957) have shown that hypomagnesaemia may be produced by turning cattle out on to lush pastures which have been treated with heavy dressings of nitrogenous fertilisers. The Shinfield workers believe that the condition is related to the protein content of the diet.

Head and Rooke (1955) found that when cows were fed with fresh spring grass the serum magnesium concentration and the urinary output of magnesium fell rapidly. On the basis of the latter observation and the work of McCance and Widdowson (1942) in man, Head and Rooke suggested that there was decreased absorption of magnesium from the intestine. As the rumen of these animals contained high concentration of ammonia, they suggested that this might be the factor interfering with magnesium absorption. However, when they administered ammonium salts through a rumen fistula, they found that although the urinary output of magnesium fell to the same extent as when grass was fed, the fall in serum magnesium concentration was not so marked.

The question now arises, why should decreased intestinal absorption affect the serum magnesium concentration? A reasonable answer to this question can be given when we consider the fact that the magnesium which is absorbed from the intestine is not only that ingested, but includes that which enters with the digestive secretions. The digestive secretions contain electrolytes at concentrations approximately the same as those of the extracellular fluid (E.C.F.) A cow produces daily a volume of digestive secretions equal to half of the E.C.F. Normally, this is practically all resorbed along with the electrolytes it contains. If a factor in the diet can interfere with the absorption of magnesium, *e.g.* by forming insoluble complexes, then it will not return to the E.C.F. and the concentration there will fall, unless magnesium can be obtained from the store in the bones. According to Blaxter (1956) susceptibility to grass tetany increases with age as the reserve of magnesium in the bone becomes less available for replacing that lost from the E.C.F.

If the fall in serum magnesium concentration in grass tetany is due to an "absorption defect" the beneficial effects of "flushing" with magnesium can be explained. The increased concentration of magnesium in the intestinal contents so maintained allows the absorption of enough magnesium to prevent any significant drain from the E.C.F. despite the "absorption defect."

This British work has emphasised the importance of the high nitrogen content of "tetany-producing pastures"; Dutch workers (Brouwer, 1952; Sjollema *et al.*, 1955; Kemp & 'T Hart, 1957) emphasise the importance of high potassium intake. Kemp and 'T Hart (1957) claim that there is a direct relation between the incidence of grass tetany and the ratio $\frac{K}{Ca+Mg}$ in the diet. It is of interest that potassium and ammonium ions exhibit certain similarities in chemical behaviour such as the formation of homologous double salts. In principle, therefore, there is no *a priori* reason why they should not behave similarly or in consort in producing a magnesium "absorption defect."

Though "flushing" with magnesium represents a practical method of controlling grass tetany we are a long way from knowing its aetiology, and it appears that more fundamental work on the normal homeostasis of magnesium in ruminants is necessary. The processes of absorption and excretion seem worthy of special attention, with particular reference to the effects of other dietary constituents. In this connexion the work of Stewart and Moodie (1956) is of interest as they found much greater absorption when magnesium was supplied as the nitrate instead of the sulphate.

A. A. WILSON (April, 1958).

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Congress in the Isle of Man

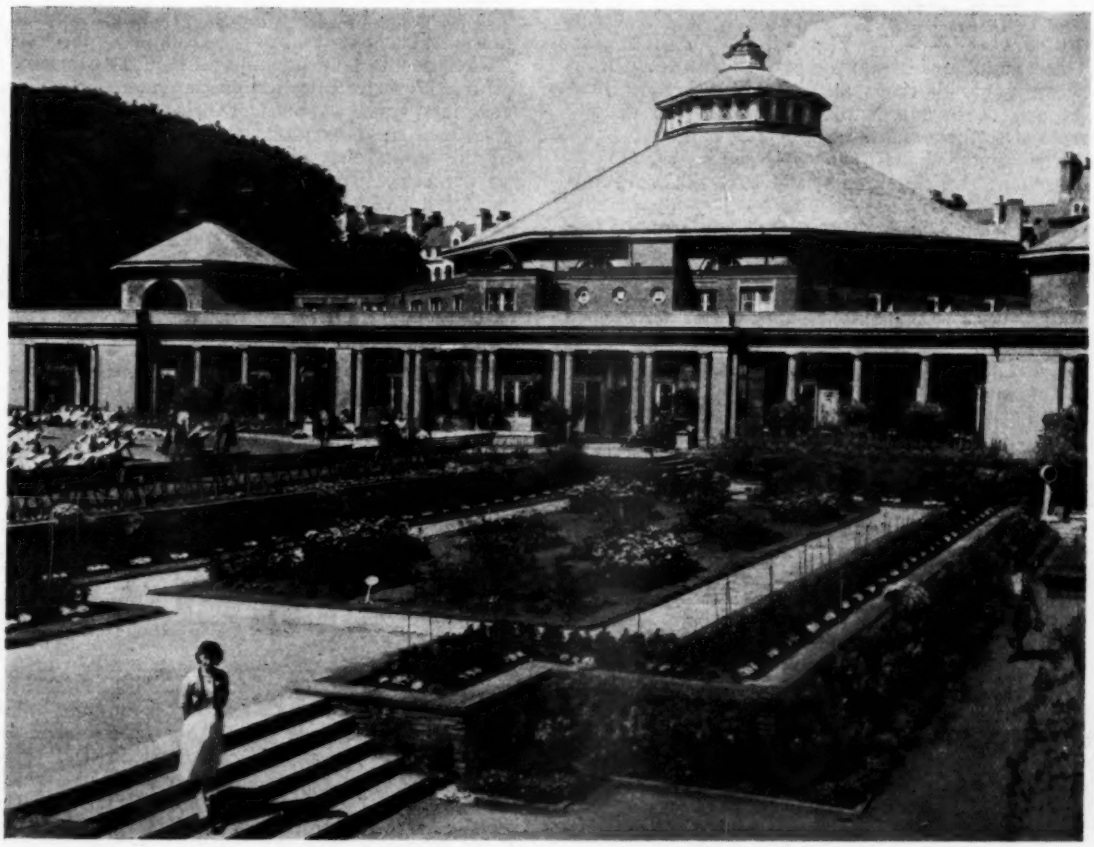
The Annual Congress of the B.V.A. is to be held this year in the Isle of Man from September 21st to 27th. We are indebted to Mr. L. Bond for this account of the island's history and amenities.

IN the earliest days, long before the Roman occupation in Britain, this island was probably known as "Mon," the Gaelic name for mountain, and from this name the present name "Isle of Man" is undoubtedly derived. It seems to have been a prosperous place, noted for the fact that Manannan Mac Lir, the Celtic God of the Sea, had chosen to make his home there; and at the approach of Royalty, either as friends or enemies, he enshrouded the island with mist so that it could never be found. His efforts must have been fairly successful because the island appears to have been very elusive to the Romans. It was never occupied by a Roman garrison, and there are few traces of any Roman visits.

The first record of Viking invasoin was in A.D. 798, when the record tells us that the "North men sacked Innes Patrick." This undoubtedly refers to St. Patrick Island, upon which there was an early Celtic church. During the next century, the Vikings made several attempts to conquer the island, but at no time were they able to secure a firm foothold, although traces of Viking occupation, extending over a period of years, have been found.

In A.D. 1077, however, the Manx people met their match when Godred Croven, a renowned Viking chieftain, landed at Ramsey, and at the Battle of Skye Hill, defeated the local resistance, and founded the first Nordic kingdom of Man. The rule of the Vikings continued for close on 200 years, and so far as we can ascertain life in the island in those days was as peaceful and happy as life in any Viking community could be. The Vikings intermarried with the natives, and although they have left their mark in the place names of the Island, and in its system of government, they were soon converted to Christianity and adopted most of the Manx customs.

In the middle of the 13th century, the Viking kingdom of Man was overthrown, as a result of the battle of Largs, when King Alexander III of Scotland



The Villa Marina, where the Congress sessions will be held.

defeated the Vikings in the north-west part of the British Isles. Stability was not regained until 1405, when the island passed into the control of the House of Stanley, later to become the Earls of Derby. Sir John Stanley, in 1405, was Governor of Dublin Castle, and as a reward for services rendered, was granted the ownership of the island.

Space will not permit a full description of the interesting developments in earlier centuries or of the many reforms introduced by the Derbys. In 1828 the island was purchased by the British Crown from the then Dukes of Athol, into whose hands the island had passed by inheritance. The principal reason for the interest of the British Government in the island at that time arose because it had become the centre of a vast smuggling trade which was defrauding the British Government of hundreds of thousands of pounds in revenue each year. As an independent country, dutiable articles were freely landed in the Isle of Man and were then " run " by night in small luggers into England, Ireland, Scotland and Wales.

The purchase price was £428,000, all of which the British Government recovered from the surplus revenue by 1860.

The Isle of Mah is 227 square miles in area. From the Point of Ayre in the North, to Spanish Head in the South, it is 30 miles long and 12 miles wide at its widest point. The most notable physical characteristic is the mountain range from North Barrule down through the highest peak, Snaefell (2,034 ft.), to Cronk-ny-Irrey-Lhaa (1,449 ft.) in the south east. These mountains divide the island in two, and from here a score of rivers and streams run to the sea through deep valleys, most of which are densely wooded to form charming glens.

The capital is the town of Douglas, with 25,000 inhabitants, which takes its name from the confluence of two rivers, the Dhoo, or dark stream, and the Glass, or clear river. Up to the middle of the last century the capital was the ancient town of Castletown, nestling around the walls of the ancient fortress of the Lords of Man, Castle Rushen. Although not the seat of the Manx Government, Castletown has remained to its people " the centre of fashion and learning, culture and politics, of justice and society."

For the last 80 years the tourist industry has, to a very large extent, overshadowed all others. To-day it is the principal means of support for the island's population of 54,000 and attracts about £12,000,000 revenue each year. Between 500,000 and 600,000 visitors are accommodated each summer from the months of May to September.

The growth of the tourist industry has caused profound changes in the whole economy of the island. From being a people whose lives centred around the family croft and family fishing boat, with occasional work at Foxdale and Laxey in the lead mines, the Manx people have had to adjust themselves to a comparatively new role. During the last 100 years there has been a complete drift away from the land and sea, the effects of which are still visible in the deserted upland farms, and in the decrease of the Manx fishing fleet.

In 1934 the first air service to the island was started. The first airport was a grass field on a farm at Ronaldsway, at the exact spot where the Vikings had beached their galleys 1,000 years earlier. Air traffic steadily increased year by year, until in 1958 it is estimated that 200,000 people will be handled at the modern airport which has now grown up on the Ronaldsway site.

One cannot mention the Isle of Man without bringing to mind the famous T.T. motor-cycle races. The reasons which led the Isle of Man to become so intimately associated with car and motor-cycle racing are interesting. In 1904 the Royal Automobile Club decided to organise a trial to chose the three British cars which would compete for the International Gordon Bennett Cup. In Britain it was illegal to close roads for racing. In the Isle of Man such difficulties were easily solved. An approach was made to the island's Legislature who quickly passed an Act which enabled roads to be closed for racing purposes.

The T.T. races are held annually in the first week in June, whilst in September a comparable event, the Manx Grand Prix is held for non-professional racing motor-cyclists. The people of the Isle of Man feel proud that the prominent position now occupied by British motor-cycles, is to some large extent due to the facilities for development which the island has provided.

The development of the tourist industry has tended to overshadow the fact that the Isle of Man has always been, and still is, primarily an agricultural community. The economy of the Manx agricultural industry, however, is closely tied to the demands of the tourist trade. Of the total agricultural land 53 per cent. is arable, 27 per cent. rough grazing and about 20 per cent. is in grass. About half the arable land is under rotational grass, oats are sown on about 27 per cent. of the land, roots and potatoes on approximately 15 per cent. There are about 1,000 holdings, the majority of which are small in area, the average being about 100 acres or less. Dairy farming predominates and the cycle of milk production is adjusted to provide peak supplies of milk during the summer months when the tourist season is at its height. There is an exportable surplus of oats and substantial export of Manx lamb. Of recent years Government assistance has been given to the production of beef cattle with encouraging results. An important development has been that the T.T. attested herd scheme now includes every dairy herd in the island and bovine tuberculosis has been virtually eliminated. Indeed, in the whole field of animal health and hygiene, the Isle of Man is ahead of the United Kingdom. The advantages of control afforded by the island's isolation, whereby there is control of import and export, would suggest that, in the near future, the Isle of Man will be able to eradicate many animal diseases. It is hoped to introduce a substantial export of high quality animals for breeding purposes.

Such is the Isle of Man, " the island that likes to be visited," an island of mountain and of moor and glen ; of breathtaking loveliness ; of quiet valleys and heather-clad hills ; an island steeped in history and mythology ; a little nation which tries to live up to its three-legged emblem and to its motto : " *Quo Cum Que Jaceris Stabit* "—" It will stand wherever you may throw it."

Preliminary List of 1958 Congress Papers and Principal Functions

Below we publish a preliminary list to give members of the Association an approximate idea of the subjects which will be discussed at the 1958 Annual Congress to be held in the Isle of Man from September 21st to 27th.

It is hoped to publish the detailed programme in the very near future.

Sunday

Evening. Choral Evensong, St. Thomas's Church, Douglas; Council Meeting; Lancashire Division "At Home"; Film Show in Aid of Benevolent Funds.

Monday

Morning. Official Opening of Congress and Civic Welcome; Opening of Trade Exhibition; Annual General Meeting and Presidential Address.

Afternoon. Papers: Metabolic Diseases of the Ruminant: 1. In Relation to Husbandry; 2. Vitamin D in Milk Fever; 3. Acetonaemia. Eczema in the Cat and Dog.

Evening. Civic Reception.

Tuesday

Morning. Papers: Salmonellosis in Animals; Nervous Diseases in the Dog. Plenary Session: Livestock Improvement in Britain.

Afternoon. Plenary Session: Placental Transference of Antibodies. Paper: Respiratory Diseases of Poultry.

Evening. Ladies' Guild Dance.

Wednesday

Morning. Papers: New Techniques in A.I.; Pyometra in Small Animals. Plenary Session: (Title to be announced.)

Afternoon. Demonstrations: 1. A.I.; 2. Meat Inspection Techniques; 3. Mycotic Dermatitis.

Evening. Annual Banquet.

Thursday

Morning. Papers: Diseases of the Auditory Meatus in the Dog; The Rôle of the Veterinarian in Public Health. Plenary Session: The Global Picture of Animal Disease.

Afternoon. Papers: Diseases of the Lactating Sow and Piglet; Fore Limb Lameness in the Horse.

Evening. Isle of Man Board of Agriculture Reception and Theatre Party at the Gaiety Theatre.

Friday

Morning. Paper: The Professional and Legal Responsibilities of the Veterinary Surgeon.

Afternoon. Paper: Dystocia in the Bovine Animal.

Evening. President's Reception.

News and Comment

THE FINANCE BILL

Members of the profession who have not read details of this Bill in the newspapers will be interested to learn that it gives details of the proposed new income tax deduction, costing £1,000,000 in a full year, which can be claimed in respect of subscriptions to professional societies with activities relating to an employee's work.

A schedule includes certain registration fees and contributions payable, among others, by veterinary surgeons.

Provision is made for bodies in receipt of annual subscriptions to have their names added to the approved list. But they must not be of a mainly local character.

Their activities must be solely or mainly directed to objects such as the advancement of knowledge in a profession or the improvement of standards of conduct and competence among its members.

THE INTERNATIONAL SCIENTIFIC FILM ASSOCIATION

The 11th Congress of this Association was held in Amsterdam from September 21st to 27th, 1957. The committee of the veterinary section consisted of the following members: Professor Dr. L. de Blieck (Netherlands), Professor Dr. G. H. B. Teunissen (Netherlands), Professor Dr. F. Schoenaers (Belgium), and Professor F. Lucam (France).

Veterinary films were shown on September 24th and 25th, and were watched by a large number of veterinarians and other congress members. The titles were as follows:—

"Neurological abnormalities in small animals" (Netherlands). This film, an abstract of a longer one in the field of neurology, showed a number of disorders mainly in the spinal marrow.

"Aural resection (Dog)" (Great Britain).

"Réactions anaphylactiques des vaisseaux mésentériques du lapin" (Belgium).

"Les greffes artérielles hétérogènes" (France). The part of this film on experimental surgery in the dog was shown.

"Artificial insemination in chickens and turkeys" (Great Britain). A popular science film.

"Excision of vaginal wall fibroma" (Great Britain).

"Samenübertragung beim Rind. IV. Beurteilung des Samens" (W. Germany).

"Geburtshilfe beim Rind" (W. Germany).

"A study of the thalamic relay for taste" (Sweden).

"East-Coast Fever" (Union of South Africa).

"Applied anatomy as related to anterior vena cava bleeding in the hog" (U.S.A.).

"Hidatidosis" (The Argentine).

"Nagana" (Union of South Africa).

XUM

"Large-scale cultivation of foot-and-mouth disease virus" (Netherlands).
"Artificial insemination in pigs" (Norway).
"Kaiserschnitt beim Rind von der linken Flanke unter hoher Extraduralanästhesie" (Austria).
"Die Naht des Zitzenrisses und der Zitzenfistel beim Rind" (W. Germany).

COMPARATIVE MEDICINE AT CAMBRIDGE

A Society for the Study of Comparative Medicine has been formed at Cambridge to promote discussion on clinical disease in man and animals, with the Regius Professor of Physic, Professor J. S. Mitchell, F.R.S., as President. The first meeting was held on May 2nd at the Radiotherapeutic Centre, Addenbrookes Hospital, when the subject discussed was Haemolytic Disease of the Young. Dr. R. R. A. Coombs was chairman for the meeting and the following presented papers: Dr. G. Fulton Roberts (Dept. of Pathology), Dr. D. M. T. Gairdner (Paediatrician to Addenbrookes Hospital), and Dr. R. F. W. Goodwin (Dept. of Veterinary Clinical Studies).

The following have consented to act on the first committee: Professor L. Banks, Professor L. P. Pugh, Dr. R. R. A. Coombs, Mr. A. R. Jennings, Dr. A. Rook, with Dr. G. A. Gresham and Dr. P. S. Pugh as Joint Secretaries.

DOMESTIC DOG TRAINING SOCIETY

(Aldershot, Farnborough, and District)

To the organising committee of this Society probably the most surprising and impressive feature of the first session, held on April 11th, at the R.A.D.C. Depot, Duke of Connaught's Road, Farnborough, was its overwhelming success. Never even in their most optimistic moments did they anticipate the enthusiastic support they received from dog owners in the district.

After a short talk from the chairman (Major Wilkins) the session commenced at approximately 7.45 p.m. and finished at 9.30 p.m. On enquiry at the end the owners and most dogs were very keen to return weekly.

In the course of his remarks the chairman said:—

"Anything which can reduce—or aims at reducing—the appalling accidents on our roads must be welcome by all thinking citizens. Thus the aims and objects of this new society, which is primarily concerned with the lessening of accidents, is laudable and merits wide support. There are secondary objectives, of course, and these include house and property protection, truer companionship between dog and owner, and for the enthusiast, 'pot-hunting' at obedience and other competitions.

"The society is a non-profit-making concern and its objectives are going to be achieved without any cost to the public. We are organising and doing all this for your benefit; our time is being given, and this hall is being provided by the Military authorities at a nominal rent.

"Our training objective is to make the average domestic dog obedient and accident-proof in five lessons.

"You all want your dogs to be a pleasure to you and not a nuisance—it is our intention to see that you achieve your desire. I am confident that if you follow out the lessons you are given here you will convert your pet into a pleasure. The chief trainer is Mr. Chadwick, who has had many years' experience of training, and I don't think you can find a better man for the job in the district. There is a small committee of which I am chairman, and it is this committee which is responsible for bringing this Society into existence. Representatives for the Army, the Police, and the Road Safety Committees of Aldershot and Farnborough Councils serve on it."

UNIVERSITY NEWS

Bristol

The following students passed the 3rd examination for the degree of B.V.Sc. (Pathology, Parasitology, and Animal Husbandry II): Bainbridge, J. R.; Betteridge, K. J. (with distinction in veterinary pathology); Butler, W. F.; Charleston, W. A. G. (with distinction in animal husbandry II); Cooper, Miss E. S. A.; Halhead, W. A.; Kon, Miss V. M. (with distinction in veterinary pathology); Lea, K.; Lucke, J. N.; Mason, T. A.; Mercer, Miss A. J.; Nelson, C. G.; Newman, M. A. H.; Pavord, A. D.; Vadden, M. J.

The undermentioned passed in the following subjects (A.=Animal Husbandry II; Pr.=Parasitology; Pt.=Pathology): Amodu, A. A. (Pr., Pt.); Davies, G. (A., Pr.); Parris, J. C. (A., Pr.); Roach, M. J. (A., Pt.).

HOLIDAY EXCHANGES

We have now received some further requests for hospitality from the Continent, and among them are the following suggestions:—

France

Brigitte Richard, aged 18, would like to come to England for 3 weeks, preferably in July or August, and to entertain an English girl at her home in Metz, Moselle, for an exchange holiday.

Nolven Renier, aged 13, also hopes to arrange an exchange holiday for a period of 3 weeks with a girl in this country. She has four younger brothers and sisters, and her family have a large house in Côtes-du-Nord.

François Saint Martin and Alain Moll, aged 16 and 17 respectively, are anxious to find accommodation in the same family or in the same town. Both of them speak a little English, and they would like to stay for 15 days to a month, preferably during August of this year, and to travel back to France with their hosts. François comes from Deux Sèvres and Alain from Charente.

Pierre Bérujon, aged 15, also speaks a little English and he would like to entertain an English boy at his home in Saône-et-Loire for 3 or 4 weeks, either returning to England with his guest this year or arranging for an exchange holiday in 1959.

Jean and Claude Raisky, aged 18 and 17 respectively, would like to come to England for a month

at some time between June 15th and September 15th and to teach French in exchange for hospitality. They would prefer to stay in or around London.

Germany

Dr. Ohly of Frankfurt am Main is anxious to arrange an exchange holiday for his son, Karl-Peter, aged 15. Karl-Peter speaks English, and he could come to England for any period from the middle of July to the middle of August; if possible he would prefer to travel back to Germany with his host so that he could spend as long as possible with his English friend.

Wolfgang Stock, aged 18, would like to visit London, and he suggests an exchange visit to his house in Wetzlar for a boy of his own age on dates to be arranged. Wolfgang also speaks English.

Members of the profession interested in contacting any of the above are asked to write to THE VETERINARY RECORD at their earliest convenience.

PRESIDENT OF THE R.C.V.S. IN JAMAICA

The President, Mr. G. N. Gould, was the guest at a dinner party given by the Governor of Jamaica, at King's House on April 30th, 1958. Amongst others present were Sir Christopher Cox, Educational Adviser to the Secretary of State for the Colonies; Sir Robert Drayton, Chief Legal Draftsman in Jamaica; and Lady Drayton, Lord Buckhurst, and Mr. Justice Cools-Lartigue.

Following a conference held by the Minister of Agriculture, The Hon. W. M. Seivright, at which the President was present together with the Permanent Secretary of the Ministry and other staff, a reception was held in honour of the President at which the following members of the veterinary department and private practitioners in the Island of Jamaica and their wives were present.

Among the guests were Dr. L. T. McDonnough, Director of Veterinary Services, and Mrs. L. T. McDunnough, Dr. and Mrs. C. L. Bent, Dr. and Mrs. A. C. Lewis, Dr. L. E. McLaren, Dr. F. Alexander, Dr. K. D. Urquhart, Rev. and Mrs. K. D. Pronger, Dr. and Mrs. A. Turnbull, Dr. and Mrs. G. O. Rushie Grey, Dr. and Mrs. C. F. Wells, Dr. and Mrs. L. R. Geffen, Dr. and Mrs. L. Richardson, Dr. and Mrs. B. Nestel, Dr. Marion Orr, Dr. G. C. Brown, Dr. J. Masterton, Dr. and Mrs. D. Clay, Dr. and Mrs. I. Sturdy, Dr. T. Clacken, and Dr. Robert Mitchell.

R.C.V.S. DAY

The times of the various functions on R.C.V.S. Day, Wednesday, June 11th, 1958, will be as follows:—

Corporate Service in the Queen's Chapel of the Savoy, 11.45 a.m.

Annual luncheon in the Savoy Hotel, 12.30 for 1 p.m.

Annual General Meeting at 3.45 p.m.

Applications for seats should be made to the Registrar, 9, Red Lion Square, London, W.C.1, and members are reminded that tickets for the luncheon can only be issued upon the receipt of the appropriate remittance.

HOUSE OF COMMONS COCKTAIL PARTY

The officers of the B.V.A., together with the chairman of the Editorial Committee, the chairman and vice-chairman of the Parliamentary and Public Relations Committee, and other senior members of the profession, attended a cocktail party last Tuesday at the House of Commons. Their hosts were Mr. A. E. Baldwin, Mr. A. J. Champion, Sir James Duncan, Mr. Lance Mallalieu, Mr. J. Morrison, and Mr. T. F. Peart. Among other Members of Parliament present were: Lt.-Col. W. H. Bromley-Davenport, Mr. R. Fort, Dr. S. Hastings, Mr. D. Healey, Mr. A. Hurd, Mrs. L. M. Jeger, Sir Hugh Linstead, Mr. K. Robinson, Dr. B. Stross, and the Rt. Hon. Tom Williams.

R.C.V.S. OBITUARY

BROOKSBANKS, Austin Sullivan, 10, Blundell Crescent, Birkdale, Southport, Lancs. Qualified December 23rd, 1896, at the Glasgow Veterinary College. Died April 29th, 1958, aged 84 years.

PERSONAL

Dr. Stableforth and **Dr. A. B. Paterson** will present papers on "The Diagnosis of Bovine Brucellosis: A Comparison of Methods in Current Use" and "Reactivity to Avian and Mammalian Tuberculins in Tuberculosis-free Cattle" at the invitation of L'Office International des Epizooties, during its meeting in Paris, May 18th to 24th.

Professor H. D. Kay, it is reported, is to retire in September, after 25 years as director of the National Institute for Research in Dairying.

He will undertake a survey of dairying activities in various countries for the Food and Agriculture Organisation, to whom he has been adviser on dairy production since 1948.

Sir Thomas Peacock is reported to be retiring from the chairmanship of the Milk Marketing Board, a position he has held since 1952. He will continue to be a member of the Board, representing the North Western region. He will of course remain chairman of the 15th International Dairy Congress to be held in London in June next year.

Births

DORAN.—On April 8th, 1958, to Jeannine, wife of G. P. Doran, B.V.SC., M.R.C.V.S., of The Close, Thornbury, Gloucestershire, a sister (Rowena) for Anita and Susanne.

SIMS.—On April 21st, 1958, to Joan, wife of Frank W. Sims, B.V.SC., M.R.C.V.S., of 16, West Road, Congleton, a son, Andrew William.

WOOD.—On April 29th, 1958, to Margaret, wife of David R. Wood, B.V.M.S., M.R.C.V.S., of Market Weighton, East Yorks, a son, Alisdair.

Marriage

HARRIES—HAMMOND.—On April 28th, 1958, at All Saints' Church, Longhope, Gloucestershire, Leslie Gwyn Harries, B.SC. (LOND.), M.R.C.V.S., to Rosemary Ann, elder daughter of Mr. and Mrs. Fred Hammond, of Hillcroft Farm, Longhope, Gloucestershire.

XUM

WILLIAMSON—BEARDWOOD.—At St. James' Church, West Derby, Liverpool, on April 7th, 1958, G. Alan Williamson, B.V.SC., M.R.C.V.S., younger son of Mr. and Mrs. H. B. P. Williamson of Old Bank, Appleby, Westmorland, to Marion Beardwood, M.C.S.P., second daughter of Mr. and Mrs. J. Beardwood of 7, Maxwell Road, West Derby, Liverpool.

THE ANIMAL HEALTH TRUST

At a dinner party in London recently, to which the hosts—Messrs. A. J. Peppercorn, A. G. A. Fisher, and J. L. E. Ogier—had invited a number of other leading members of the broiler industry to meet Lord Rank, chairman of the executive committee of the Trust. there was a generous response to an appeal for support of the Trust's poultry research fund. Lord Rank spoke of the special significance to table poultry production of the work of the Houghton Research Station. Substantial further additions to the fund are expected in the near future.

COMING EVENTS

May

15th (Thurs.). Annual General Meeting of the Supplementary Register Division at 7, Mansfield Street, Portland Place, London, W.1, 3 p.m.

Ordinary General Meeting of the South Eastern Veterinary Association at the Royal Star Hotel, Maidstone, 6.30 p.m.

16th (Fri.). Annual General Meeting of the Society of Practising Veterinary Surgeons in the Station Hotel, York, 2.30 p.m.

Annual Ball of the R.V.C. Students' Union at the Royal Veterinary College, London, N.W.1, 9 p.m.

20th (Tues.). Spring Meeting of the Eastern Counties Veterinary Society at the Duke's Head Hotel, King's Lynn, 12 noon.

21st (Wed.). Meeting of the Section of Comparative Medicine, Royal Society of Medicine, at the Society's House, 5 p.m.

Meeting of the Warwickshire Veterinary Club at the Regent Hotel, Leamington Spa, 8 p.m.

22nd (Thurs.). Annual General Meeting of the Essex Veterinary Society at the Saracen's Head Hotel, Chelmsford, 7.30 p.m.

Annual General Meeting of the Midland Counties Veterinary Association at the Birmingham Medical Institute, 36, Harborne Road, Birmingham, 15, 2.30 p.m.

Annual General Meeting of the Herts and Beds Veterinary Society at the George Hotel, Luton, 7.30 p.m.

28th (Wed.). Annual General Meeting of the Southern Counties Veterinary Society at the Red Lion Hotel, Salisbury, 7 p.m.

30th (Fri.). Ordinary General Meeting of the Royal Counties Veterinary Association in the Village Hall, Compton, 2.30 p.m.

June

11th (Wed.). 115th Annual General Meeting of the Royal College of Veterinary Surgeons at 10, Red Lion Square, London, W.C.1, 3.45 p.m.

Annual General Meeting of the Victoria Veterinary Benevolent Fund at 10, Red Lion Square, W.C.1, 10.15 a.m.

12th (Thurs.). Annual Meeting of the R.A.V.C. Golfing Society at the North Hants Golf Club, Fleet, 10 a.m.

20th (Fri.). Meeting of the Society for the Study of Animal Breeding at Lyndhurst, Hants.

25th (Wed.). Summer Meeting of the Herts and Beds Veterinary Society.

September

21st to 26th (Official Opening, Monday, September 22nd). 76th Annual Congress of the British Veterinary Association in Douglas, Isle of Man.

BRITISH VETERINARY ASSOCIATION QUARTERLY MEETINGS IN LONDON

Wednesday, July 9th—No. 7, Mansfield Street

10.00 a.m. Veterinary State Medicine Committee.
11.30 a.m. Parliamentary and Public Relations Committee.
2.00 p.m. Finance Sub-committee.
3.45 p.m. Home Appointments Committee.

Thursday, July 10th—No. 7, Mansfield Street

9.30 a.m. Small-Animals Committee.
11.30 a.m. Farm Livestock Committee.
2.15 p.m. General Purposes and Finance Committee.

Friday, July 11th—Connaught Rooms, Gt. Queen Street, W.C.2

10.15 a.m. Council.

Factors that Predispose to Mastitis with Special Reference to Milking Technique

We are asked to draw attention to one of the references in this paper (*Vet. Rec.* **70**. 159-66) which was incorrectly recorded. It is that under Holman *et al.*, and should read, Holman, H. H., Pattison, I. H., & Taylor, J. I. (1950). *J. Comp. Path.* **60**. No. 2. 100-7.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Ayr. Holmston Farm (Apr. 29).
Ches. Foxley Farm, Radway Green, Barthomley, Crewe (Apr. 28).
Dumfries. Penlaw Farm, Lockerbie (May 1).
Glos. Manor Farm, Tormarton, Badminton (Apr. 25).
Kircudbright. Hill Farm of Culreoch, Gatehouse of Fleet, Castle Douglas (Apr. 26).
Lancs. Dunkirk Farm, Read, Burnley (Apr. 29).
Northants. Field adjacent to Marsh Lane and Canal, Irthlingborough, Wellingborough (Apr. 30); Manor Farm, Woodford, Kettering (May 1).
Somerset. Batch Farm, Stoke St. Michael, Bath (Apr. 29).

Fowl Pest

Essex. Kiln Farm, Oldheath, Southminster (Apr. 29).
Herts. Little Thele, Great Amwell, Ware; 58, King Edward Road, Ware (Apr. 28); 22, Bowling Road, Ware (May 1).
Lancs. Greenacres, Greenhalgh, Kirkham, Preston (Apr. 25); Dale Garth, Out Rawcliffe, Preston; Springfield, Drumacre Lane, Longton, Preston; Lawnbank, Liverpool Road, Longton, Preston (Apr. 30).
Norfolk. Villa Farm, Marham, King's Lynn (Apr. 25).
Surrey. 6, Croydon Lane, Banstead (Apr. 29).
Sussex. Ovingdean Hall Farm, Ovingdean, Brighton (Apr. 28); Foords Farm, Vines Cross, Horam (May 1).

Swine Fever

Caerns. Cae efa Lwyd Farm, Penygroes (Apr. 30).
Ches. Balderton Piggeries, Lache Lane, Balderton; Claybank Farm, Allostock, Knutsford (Apr. 28).
Denbigh. Clappers Farm, Gresford, Wrexham (Apr. 25).
Dorset. The Piggeries, Chickerell Allotments, Chickerell, Weymouth (Apr. 25).
Glos. Manor Farm, Burnett, Keynsham, Bristol; Church Mead Farm, Pucklechurch, Bristol; 61, Wraxhall Road, Cadbury Heath, Bristol (Apr. 28); Redfield Hill, Bitton, Bristol (Apr. 29).
Herts. Sissernes Farm, Welwyn (Apr. 25).
Leics. Hillcrest Farm, Osgathorpe, Loughborough; Piggeries rear of Stamford Arms, Groby (Apr. 29); White House Farm, Heather; The Piggery, Manor Farm, Main Street, Heather (May 1).
Staffs. Ivy Cottage, Six Ashes Road, Halfpenny Green, Bobbington, Stourbridge (Apr. 25).
Suffolk. Gable Cottage, Aldham, Hadleigh (Apr. 25); East Green Farm, Kelsale, Saxmundham (Apr. 28); Fenns Farm, Combs, Stowmarket (Apr. 29); Ivydene Cottage, Combs, Stowmarket (May 1).
Surrey. Furzehills, Churt, Farnham (Apr. 28); 12a, Sandhills Lane, Thorpe, Egham (Apr. 29).
Warwicks. Silverdene, Malthouse Lane, Earlswood, Solihull (Apr. 28); Mereside, Cloweswood Lane, Earlswood, Solihull (May 1).
Worcs. High Elms Farm, Lower Bentley, Redditch (Apr. 28).
Yorks. Hill Top Farm, Birkenshaw, Bradford (Apr. 28); Longlands Farm and Meal Hill Piggery, Slaithwaite, Huddersfield (Apr. 30).

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

Lapinised Rinderpest Virus

Sir,—I must thank you for your courtesy in publishing my letter (Mares, 1957), and, although it now appears that I was mistaken in my conclusions I do not regret their publication. Had I not published I would not have got in touch with a more experienced worker and had some most fruitful discussions.

Perhaps I may briefly explain in your columns why I no longer think that lapinised virus changes after repeated passage in rabbits.

I have now examined true random samples of the temperature curves from all the rabbit virus makers that have been passaged in Accra since 1950. I find no significant difference in the incubation time, the time to reach maximum temperature, and the temperatures of the rabbits from one year to the next *except in 1955 and 1957*. I find that these responses do not differ significantly from those reported by Scott and MacLeod (1955). In 1955 and 1957 I find that the responses resemble those reported by these workers *when injecting rabbits with very small doses of virus*. As I was the officer passaging the virus in these two years it appears that my technique is the variable, and not the quality of the virus. Confirmation of this is given by the fact that responses of rabbits injected since I have been on leave have returned to normal.

The standard practice in Ghana is to use minced spleen and heart blood as the source of virus for the next passage. The only difference in my own technique has been to use heart blood only. This is a method of convenience as the seed material can be placed straight into refrigeration without undergoing mincing and straining. The advantage in convenience now appears to be offset by the increased incubation period when passaging at standard intervals and consequent delay in reaching maximum titre.

The reason for the increased incubation period is probably due to the fact that blood is less rich in virus than spleen (Scott, 1954). This would explain why my results resemble those of Scott and MacLeod when injecting rabbits with small doses of virus (*op. cit.*). It is also known that a low concentration of virus delays the temperature response in cattle (Brotherston, 1956).

As I said previously there is no conclusive evidence that wet lapinised virus prepared in this way is any less effective in the field.

Yours faithfully,
R. G. MARES.

"Braidwood Brae,"
Temple,
Midlothian.
May 3rd, 1958.

References

BROTHERSTON, J. G. (1956). *Vet. rev. Annot.* **2**. 95-106.
MARES, R. G. (1957). *Vet. Rec.* **69**. 981.
SCOTT, G. R. (1954). *Brit. Vet. J.* **110**. 152-7.
———, & MACLEOD, W. G. (1955). *J. Comp. Path.* **65**. 236.

The Founding of the Veterinary College, London

Sir,—I certainly agree with Mr. J. W. Barber-Lomax when he expresses the belief that Granville Penn would not have been prepared to consider anyone but St. Bel for the first Professorship of the Veterinary College, London. From the time when he first met him in October, 1789, Penn bent all his energies to bring about the establishment of the College in London based on the Frenchman's original "Plan." It is true that Penn had to re-draft the "Plan" very materially in order that it might prove acceptable to people in this country; but he must have recognised that not only was it the only plan available, but that St. Bel himself had had actual teaching experience of veterinary matters, and was, moreover, at that time the only qualified veterinarian in the country.

XUM

Mr. Barber-Lomax, in the last paragraph of his letter, refers to John Hunter's election to a Vice-Presidency as being his first real connexion with the infant veterinary profession. This is true in the sense intended in the letter, although it is recorded that on March 18th, 1791, "Sir George Baker, Sir Joseph Banks, and Mr. John Hunter were elected Honorary and Corresponding Members of the College." This, of course, does not necessarily mean that Hunter took any active part in the College's affairs as a result. It is tempting to assume that it was Hunter who was responsible for introducing into the first Constitution of the College, the following regulation:—

> "A Committee shall be chosen annually to be called the Medical Experimental Committee for the Purpose of suggesting and trying Experiments with a view to throw light upon the Animal Economy, and to discover the Effects of Medicine upon different Animals, which shall be purchased for that Purpose."

Although the term "Animal Economy" and the general composition of this regulation is suggestive of Hunter, there is really nothing more definite, at the moment, to support the idea. In the same way, it does not seem justifiable, on the evidence available, to say that Hunter wrote "the plan for the creation of the veterinary profession and the estimate of the position it should occupy in the scientific world" (see F. Smith's "Account of the Veterinary College from its Institution in 1791," London, 1793). Hunter, although a great and outstanding Comparative Anatomist and Physiologist, was himself hardly capable of such excellent literary composition. It is far more likely to have been Granville Penn's. He had a finer command of English and his knowledge of ancient and modern history would have enabled him to set out ideals for the infant profession in the excellent way it was done in the above account.

Yours faithfully,
L. P. PUGH.

The School of Veterinary Medicine,
Madingley Road,
Cambridge.
May 5th, 1958.

A Scale of Veterinary Fees

Sir,—We were interested to read in your last issue a letter from Mr. Harrison of Matlock about a scale of veterinary fees. Such a scale is closely related to an inquiry which is engaging the attention of the Society of Practising Veterinary Surgeons at the present time. This enquiry is in the form of a detailed study of the costings of veterinary practice. Our Society initiated this study last November and an appreciable amount of work has already been done by its Economic Committee which has now met several times.

A "pilot" questionnaire on practice returns, practice structure, costings, etc., evoked an excellent response and it has now been decided, subject to approval by S.P.V.S. Council, to cast our net much wider and also to initiate other types of enquiry which have a direct bearing on the business side of veterinary practice. It is the view of our Society's Council that before one can consider what ought to be charged by way of fees, information must first be obtained showing what it costs to run a veterinary practice and this is the aim of our present labours. We believe that this information ought to be in the hands of all practising veterinary surgeons.

Although progress has so far been necessarily slow, the S.P.V.S. is sure that very useful information will emerge, it is hoped, within the next twelve months, and is much encouraged by the co-operation already received. A report on the present position will be made at the Annual General Meeting of the Society at York on the 16th inst. All practising veterinary surgeons, whether members of the S.P.V.S. or not, will be very welcome.

Yours faithfully,
EDWARD WILKINSON,
President.
G. M. G. OLIVER,
Hon. Secretary.

The Society of Practising Veterinary Surgeons,
May 4th, 1958.

The R.C.V.S. Council Elections

Sir,—Recently I received a voting paper containing a list of candidates for the impending R.C.V.S. council election. However, we, the electors, have no way of knowing the opinions of these candidates on certain matters of vital importance to the profession. I would therefore suggest that all candidates should indicate their opinions on the following subjects, through the correspondence columns of THE RECORD:—

(1) The importation of foot-and-mouth disease from Argentina (*Vet. Rec.* **70.** 176).

(2) The lack of a properly constituted meat inspection service, organised on a nation-wide basis, under *direct veterinary control*, in the United Kingdom.

(3) The adequacy of salaries for veterinary surgeons in the public service, both home and colonial.

(4) The adequacy of insurance examination fees paid to veterinary surgeons.

(5) The lack of control of hog cholera (swine fever in the United Kingdom), as compared, for instance, with the degree of control which has been achieved in Canada, by means of a regulation to *enforce* the boiling of all garbage adequately before permitting it to be fed to pigs.

(6) Any other subjects of veterinary interest, on which they hold strong views.

Unless we, the voters, can be informed of the viewpoints of the various candidates on these subjects, the election becomes a farce.

Even if it is a little late now to obtain the views of all candidates this year, is it too much to ask that sufficient space be set aside in the pages of THE RECORD in future years, so that all candidates may have an opportunity of expressing their opinions on subjects of veterinary interest?

Yours faithfully,
J. N. SIMPSON-WHITE.

9,629, San Luis Avenue,
South Gate,
California, U.S.A. *April 28th*, 1958.